

Appendix 3.5c Detailed Calculation of Emissions from WENT Landfill Extension

Scenario 2 - Operation Year in 2045

Landfill gas used in gas engines for landfill site load	750 m3/hr
Landfill gas used in leachate recovery plant boilers	4500 m3/hr
Landfill gas to flare	52750 m3/hr
Therefore,	
Peak landfill gas generation from WENT landfill	58000 m3/hr

With reference to Table 4-4 of USEPA Air Emissions from Municipal Solid Waste Landfills - Background Information for Proposed Standards and Guidelines, March 1991 ((EPA-450/3-90-011a):

Secondary NOx emission from enclosed flare/incinerator	4.9 lb/MM scf LFG
Secondary NOx emission from gas turbine	26.4 lb/MM scf LFG
Secondary NOx emission from boiler	70 lb/MM scf LFG

Unit conversion:

	1 MM scf
=	1000000 scf
=	28316.847 scm
	1 lb/MM scf
=	452.5 g/MM scf
=	0.0159799 g/scm

Standard conditions (US standard):

	60 F
=	15.555556 C
=	288.55556 K

Assume LFG at typical ambient temperature:

	25 C
=	298 K

Therefore,

	1 m3 at 25C
=	0.9683072 scm

Therefore,

Landfill gas to flare	52750 m3/hr	
	= 51078.207 scm/hr	
	= 14.188391 scm/sec	
NOx from flare	= 1.1109715 g/sec	total of 2 stacks

Landfill gas used in gas engines for landfill site load	750 m3/hr	
	= 726.23043 scm/hr	
	= 0.2017307 scm/sec	
NOx from gas engines	= 0.0851039 g/sec	total of 2 gas engines exhaust

Landfill gas used in leachate recovery plant boilers	4500 m3/hr	
	= 4357.3826 scm/hr	
	= 1.210384 scm/sec	
NOx from boilers	= 1.353926 g/sec	total of 2 boiler exhaust

With reference to Table 4-4 of USEPA Air Emissions from Municipal Solid Waste Landfills - Background Information for Proposed

Secondary SO2 emission from enclosed flare/incinerator	3.0 lb/MM scf LFG
Secondary SO2 emission from gas turbine	3.0 lb/MM scf LFG
Secondary SO2 emission from boiler	3.0 lb/MM scf LFG
Secondary PM emission from enclosed flare/incinerator	Negligible lb/MM scf LFG
Secondary PM emission from gas turbine	37.0 lb/MM scf LFG
Secondary PM emission from boiler	Negligible lb/MM scf LFG
Secondary CO emission from enclosed flare/incinerator	58.0 lb/MM scf LFG
Secondary CO emission from gas turbine	12.5 lb/MM scf LFG
Secondary CO emission from boiler	17.0 lb/MM scf LFG
Secondary HCL emission from enclosed flare/incinerator	12.0 lb/MM scf LFG
Secondary HCL emission from gas turbine	12.0 lb/MM scf LFG
Secondary HCL emission from boiler	12.0 lb/MM scf LFG

Therefore,

SO2 from flare	= 0.6801866 g/sec	total of 2 stacks
SO2 from gas engines	= 0.0096709 g/sec	total of 2 gas engines exhaust
SO2 from boilers	= 0.0580254 g/sec	total of 2 boiler exhaust
PM from flare	= Negligible g/sec	total of 2 stacks
PM from gas engines	= 0.1192744 g/sec	total of 2 gas engines exhaust
PM from boilers	= Negligible g/sec	total of 2 boiler exhaust
CO from flare	= 13.150275 g/sec	total of 2 stacks
CO from gas engines	= 0.0402954 g/sec	total of 2 gas engines exhaust
CO from boilers	= 0.3288106 g/sec	total of 2 boiler exhaust
HCL from flare	= 2.7207465 g/sec	total of 2 stacks
HCL from gas engines	= 0.0386836 g/sec	total of 2 gas engines exhaust
HCL from boilers	= 0.2321016 g/sec	total of 2 boiler exhaust